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Wild boar in Flanders, Belgium: (dis)agreements between key stakeholders on wild boar management objectives, actions, and legal provisions

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Abstract: Wild boar (*Sus scrofa*) reappeared in Flanders, Belgium in 2006 after more than half a century of absence. Besides being a native and highly valued game species in Europe, wild boar are also known to be responsible for car collisions, crop damage, disease transmission, and ecological damage at high densities. The management of wild boar therefore seeks to balance these positive and negative impacts. Given the highly fragmented landscape in Flanders and its multifunctional use, coexistence with wild boar is only possible through integrated management involving relevant stakeholder groups. However, to be successful, this requires that the management objectives, the overall wild boar policy of the Flemish authorities, and management actions are supported by the stakeholders. To assess the support for the current management, we conducted a survey among members of the 3 key stakeholder groups: farmers, hunters, and conservationists. Our survey assessed the importance stakeholders attribute to different management objectives, their support for the current legal provisions, and how desirable the different stakeholder groups considered possible management actions. The potential for conflict index was used to analyze the (dis)agreement between and within stakeholder groups. Reducing or preventing crop damage and the risk for car accidents are indicated as being the most important management objectives by all 3 stakeholder groups. Stakeholder groups differ strongly in their support for the current legal provisions. Those stakeholders that have to implement the legal provisions or are mostly affected by these laws are less supportive than others. The desirability of the possible management actions strongly varied according to the different stakeholder groups. Contrary to other studies, the desirability of a possible management action was hardly influenced by the management objective it tried to achieve.

Key words: attitude, Belgium, human–wildlife conflict, key stakeholders, management impact, potential for conflict index, preferences, survey, *Sus scrofa*

All over the world, landscapes are becoming increasingly human-dominated and fragmented. Nevertheless, several wildlife species are able to adjust to an anthropogenic environment and are recently characterized by a strong increase in numbers and distribution all over Europe (Deinet et al. 2013). This comeback results in wildlife living in close contact with humans and interacting with human activities. Human–wildlife impacts are defined as those

effects resulting from interactions between and among wildlife, habitats, and humans that are deemed sufficiently important to require management action (Riley et al. 2002). Negative impacts, such as wildlife damage, car collisions, and perceptions of fear can limit the acceptance of wildlife by stakeholders and thus inhibit human–wildlife coexistence (Carpenter et al. 2000, Messmer 2000). Redpath et al. (2013) stress the importance of isolating the human–human interactions in this discussion. These are the real "conflicts," given that management conflicts center on different opinions between humans regarding management objectives and possible management actions to achieve certain management objectives. For those people that are not directly concerned by the possible direct impacts of the wildlife species itself, other aspects such as the cost and safety of management actions, secondary environmental impacts, or pain and suffering inflicted on animals may be of great importance and result in opposing management actions (Decker et al. 2002). These conflicts are typically shaped by the ecological and socioeconomical contexts in which they occur, often referred to as coupled systems (Morzillo et al. 2014) or socioecological systems (Lischka et al. 2018).

One of the species that is often subject of human–wildlife coexistence issues is wild boar (*Sus scrofa*). Wild boar is a species characterized by having one of the highest reproductive rates among ungulates as well as an opportunistic omnivorous behavior, flexible habitat selection, and high adjustment potential to anthropogenic disturbances (Massei and Genov 2004, Cahill et al. 2012, Stillfried et al. 2017, Rutten et al. 2019). These characteristics resulted in worldwide expansions of wild boar populations since the 1960s (Sáaez-Royuela and Telleríia 1986, Massei et al. 2015). Although wild boar can have positive impacts on ecological services such as seed dispersal, the provision of recreational hunting opportunities and food resources (Barrios-Garcia and Ballari 2012, Dovrat et al. 2012, Picard et al. 2015), there are also increasing negative impacts such as crop damage, disease transmission, damage to private and public properties, risk to human health and safety due to road-traffic accidents, and an increasing number of negative encounters in (peri-)urban areas (Ruiz-Fons et al. 2008, Schley et al. 2008, Primi et al. 2009). Moreover, wild boar can have, both within as outside their native range, a serious environmental impact on plant as well as animal communities. There is, however, a surprising lack of studies that assess these impacts quantitatively (Massei and Genov 2004).

After a local extinction of almost 50 years, wild boar returned to Flanders (northern part of Belgium) in 2006 (Casaer and Licoppe 2010). During the absence of wild boar, the structure of the Flemish landscape evolved to a dense, mosaic-like pattern of agricultural, natural, and urban areas, resulting in an increased level of wild boar interactions with human activities. The growing number of wild boar and the increase in their geographical distribution in Flanders (https://grofwildjacht.inbo.be) stir up the debate about appropriate as well as efficient wild boar management. This debate is fueled by a perception of increasing numbers of cases of crop damage, car accidents, and the fear for possible transfer of diseases. The latter is spurred on by the recent outbreak of African swine fever in the southern part of Belgium (Linden et al. 2019, Dellicour et al. 2020). There are, however, no numbers available on the extent of agricultural damage or car accidents due to a lack of systematic monitoring in Flanders (Rutten et al. 2018).

Effective management strategies are needed to maintain wild boar densities below the cultural carrying capacity (Minnis and Peyton 1995) or wildlife stakeholder acceptance capacity (Carpenter et al. 2000). These strategies have to address both socioeconomic and ecological challenges to accommodate human–wildlife coexistence (Fieberg et al. 2010). As for many other species, the opinions regarding the extent and the importance of the impacts due to the presence of wild boar differ between the stakeholders. Moreover, discussions take place over the most appropriate and effective management actions to apply, regarding the responsibilities of the different stakeholders involved and the sharing of the cost and benefits due to the presence of wild boar in the region.

Public bodies, such as forestry and nature conservation agencies, are expected to adopt management strategies and practices that serve both public and private interests. To ensure long-term support for its wildlife management

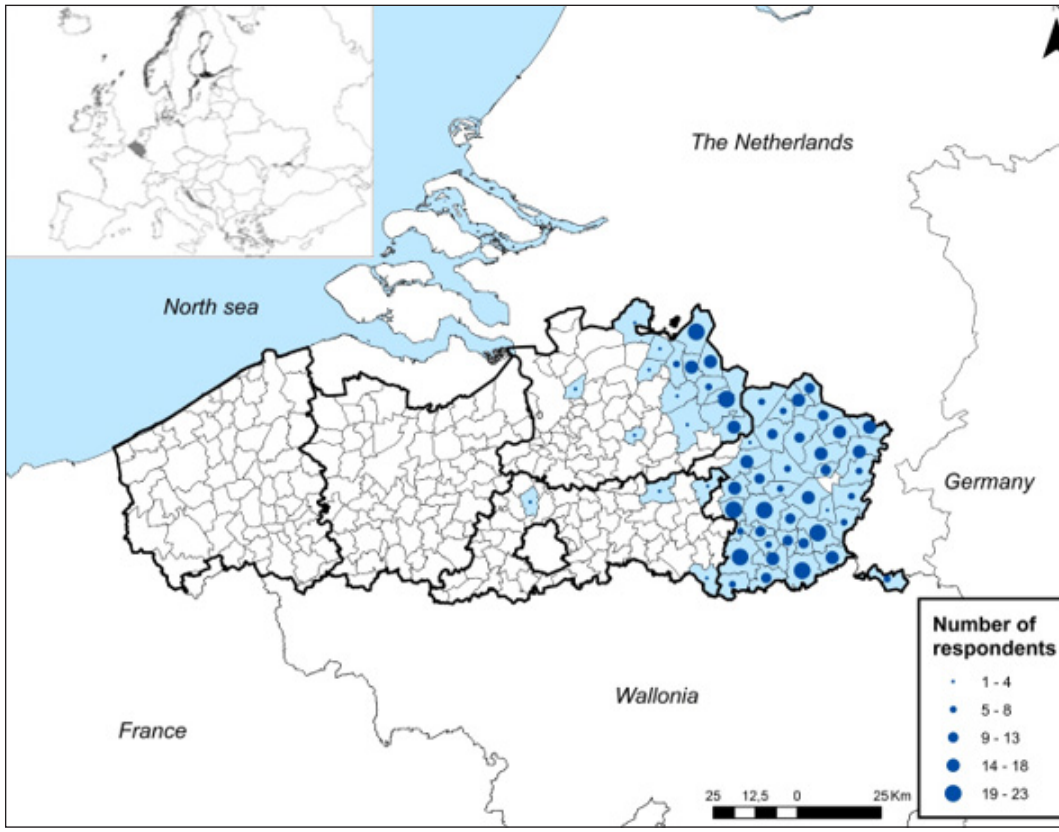

Figure 1. Geographical distribution of respondents (blue) in provinces of Limburg and the eastern part of the province of Antwerp, Belgium. The size of the bullets is proportional to the number of respondents from a municipality.

policy, the management actions that authorities advocate and legally impose should be accepted by the general public. These actions should be supported by those stakeholder groups that have to apply them (Fulton et al. 2004). This requires decision-makers to have information on generally accepted management actions and the opinions of stakeholders with fewer mainstream views (Dandy et al. 2011). To generate a greater support for both the management objectives and actions, input is important from all the stakeholders affected by decision-making. Afterward, policymakers and managers have to weigh the consequences associated with the preferences of the variety of stakeholders (Massei et al. 2011).

To gain better knowledge of stakeholders' opinions concerning wild boar management objectives, legal provisions regarding wild boar management, and management actions in Flanders, we set up a geographically targeted survey. The survey aimed to assess the importance attributed to possible management objectives, the support for current wild boar policy (legal provisions), and the desirability of management actions for members of 3 key stakeholder groups (hunters, farmers, and conservationists). The objective was to gain insight on the current similarities and differences both between and within these stakeholder groups. As previous research showed that the preference or acceptability for certain management actions can depend on the management objective or the severity of the impact the management tries to mitigate (Jacobs et al. 2014, Sponarski et al. 2015, Liordos et al. 2017, Heneghan and Morse 2019, Kontsiotis et al. 2020, Liordos et al. 2020), one of our aims was to find out if the desirability of a management action according to a stakeholder group depends on the wild boar management objective it tries to achieve. The main goals of our study were: (1) to assess the current (dis)agreement between and within the key stakeholder groups over the importance

of possible wild boar management objectives, support for current legal provisions, and desirability of possible management actions; and (2) to investigate whether the desirability of a management action changes depending on the management objective it tries to achieve.

Study area

Our study area encompassed all municipalities within or adjacent to the distribution of wild boar in Flanders in August 2016. This coincides with almost the whole province of Limburg and the eastern part of the province of Antwerp (Figure 1).

Methods

Survey

We developed a survey to gauge the stakeholders' opinions regarding the importance of possible wild boar management objectives, the support for the current wild boar policy, and the desirability of possible management actions. The survey was set up using the online platform SurveyMonkey (San Mateo, California, USA) and sent by email on July 13, 2016 to members of the 3 largest stakeholder organizations that are directly involved in the management of wild boar and its impacts in Flanders. These included the main farmers' union "Boerenbond" (BB), the main hunters' association "Hubertus Vereniging Vlaanderen" (HVV), and the largest nature conservation organization "Natuurpunt" (NP). The survey was sent to all members and employees of the organizations who had an email address (2,894 in total: 1,231 from BB, 415 from HBB, and 1,248 from NP). To increase the probability that people would reply, the invitation emails were sent by a person from within each of these organizations. A tool within the survey prevented double answers and sent reminders twice to persons who did not yet respond (3 weeks and again 2 weeks later). Aside from the questions regarding management objectives, legal provisions, and management actions, the survey also included background information questions such as age, class, and gender as well as questions regarding the respondents' perception of the current extent of the different wild boar impacts and the desired changes. These questions, however, are not the subject of this paper.

Section 1: Importance of management objectives. Respondents were asked to rate the importance of enhancing or reducing (or preventing) possible impacts (positive or negative) due to the wild boar presence as management objectives. An inventory of 17 possible objectives was made based on the literature (Runge et al. 2013, Decker et al. 2014) and previous research of our own (Casaer et al. 2013). The list of objectives (see supplementary material A) included enhancing, preventing, and reducing the following impacts: agricultural (crop) damage, transmission of diseases to farm animals, transmission of diseases to humans, availability of venison, economic gain from recreation, economic loss from recreation, car collisions, positive impact on ecosystem functioning, negative impact on ecosystem functioning, positive impact on other species, negative impact on other species, opportunity to hunt, possibility to observe, unsafe encounters, damage to gardens and private properties, and damage to public properties. The respondents could indicate the importance as a wild boar management objective they attribute to enhancing, preventing, and reducing each of these impacts using a 5-point scale: not important at all (-2), not important (-1), neutral (0), important (1), and very important (2).

Section 2: Legal provisions. A list describing 5 current legal provisions regarding wild boar management in Flanders was presented to the respondents. These legal provisions are a reflection of the overall wild boar management policy of the Flemish authorities. Respondents were asked if they agree or disagree with these 5 legal provisions that are currently in force (for more explanation, see supplementary material B): an approved shooting plan is a requirement for hunting wild boar; before one can ask to get a reimbursement for wild boar damage, preventive measures have to be applied; the allowance for shooting at night can only be obtained after applying preventive measures in the field; the hunter has the obligation to fill in a cull record for each wild boar shot; the hunter is obliged to call a veterinarian whenever a wild boar is shot to allow taking samples for disease monitoring. Again, a 5-point scale was used, ranging from strongly disagree (-2), disagree (-1), neutral (0), agree (1), and strongly agree (2).

Section 3: Management actions in relation to objective. Thirdly, respondents were asked to indicate how desirable they considered a given management action in relation to a specific management

objective. The list of 6 management actions consisted of all possible legally allowed actions in Flanders: hunting from high seats, hunting by silent driven hunts, hunting from high seats using bait, hunting from high seats by night, capturing and subsequently culling, and taking preventive measures. Shooting from high seats has been applied in the region for roe deer (*Capreolus capreolus*) hunting for many years. The other methods such as drive hunting, shooting at baiting sites, and night hunting were only authorized after the recolonization of the region by wild boar. They are, however, well known as hunting methods. Capturing and subsequently killing is a new method for ungulate game species in Flanders. The list of management objectives used in this section was a subset of the list used in the first question of the questionnaire. Given the 6 management actions listed were different possible actions to reduce the wild boar populations or take preventive measures, the objectives regarding enhancing positive impacts due to higher wild boar populations (tourism income, positive impacts on ecosystems or on other species) were omitted from the list for this section. Hunting for venison was kept in the list, given that different lethal methods were presented as possible management actions. Again, a 5-point scale was used: not desirable at all (-2), not desirable (-1), neutral (0), desirable (1), and highly desirable (2).

Data analysis

The second generation potential for conflict index (PCI_2; Vaske et al. 2010) was used to analyze and graphically display the level of (dis) agreement between and among stakeholder groups for each of the questions asked. The PCI plots allow for the communication of complex results to stakeholders and policymakers to facilitate their understanding and interpretation of information gathered through surveys (Vaske et al. 2006, 2010; Vaske 2018). A PCI plot is composed of bubbles. The location of a PCI bubble represents the mean response of a group (i.e., the degree of importance, preference, and acceptability of a specific action). Distances between the central locations of the different bubbles indicate the differences in opinion between stakeholder groups or within the stakeholder group over different possible actions. The size of the PCI bubble, representing the PCI_2 value itself, quantifies differences in opinions within the groups. The PCI_2 values range from 0–1, where 0 indicates full agreement within a group and 1 indicates maximum disagreement (the least amount of consensus and the greatest potential for conflict). Thus, the bigger the bubble, the more potential conflict there is over a specific issue within a stakeholder group (Frank et al. 2015, Sponarski et al. 2015).

Differences in scores between stakeholder groups for different management objectives (section 1), legal provisions (section 2), or management actions in relation to management objectives (section 3) were tested using repeated-measures ANOVA (rstatix package [Kassambara 2020]). A repeated-measures ANOVA was used to account for the individual differences between the participants. One of the assumptions of a repeated measures ANOVA is a normally distributed, continuous dependent variable. Because our dependent variable, the score, is ordinal, we also calculated the generalized effect sizes (hereafter, "ges") for each factor and possible interactions (settings and outputs can be found in supplemental tables S1, S2, and S3). This provided us with a second measure of the impact of our variables because the *P*-value is less reliable when using ordinal data. Pairwise horizontal post-hoc tests were done by using *t*-tests with Bonferroni correction. Data analyses were conducted in R software environment (R Studio, Boston, Massachusetts, USA). Scripts to calculate and visualize graphically the PCI_2 bubbles were written in R, based on Vaske et al. (2010) and Vaske (2018).

Results

Survey response

A total of 2,894 persons were invited to participate in the survey through the hunting association HVV, nature organization NP, and farmers' union BB. We received 810 reactions consisting of 645 fully completed surveys (116 from HVV, response rate of 28%; 332 from NP, response rate of 27%; and 197 from BB, response rate of 16%) and 165 partially completed surveys. In total, 118 people refused to answer the survey, and 1,966 people did not respond to the invitation. We based our analyses only on the 645 completed surveys (overall response rate of 22%).

Section 1: Management objectives. The 3 stakeholder groups agreed that reducing or preventing crop damage and risk of car collisions are

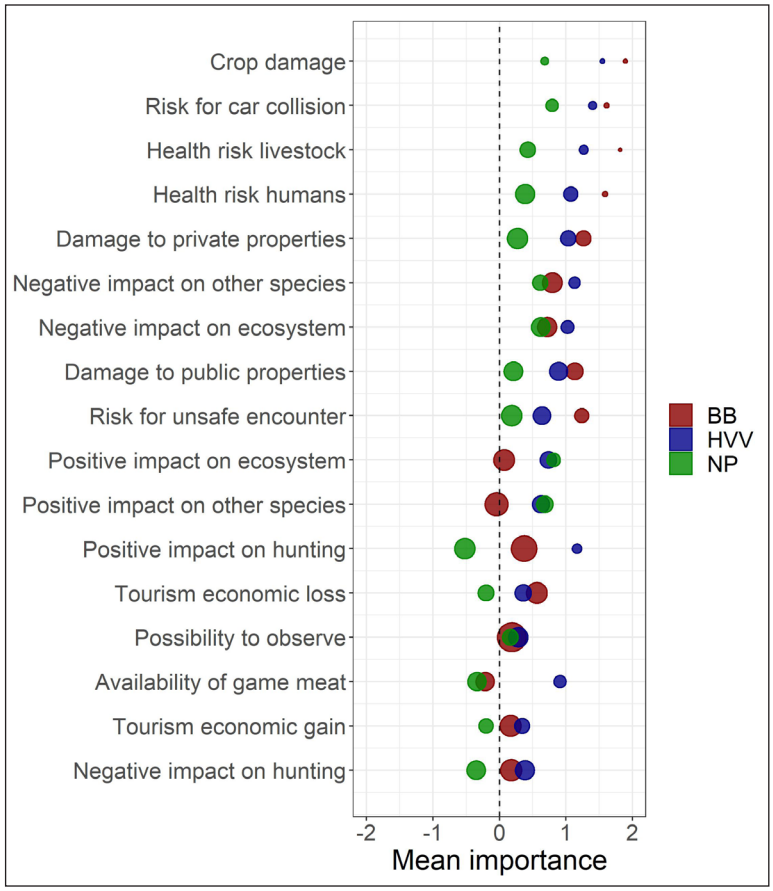

Figure 2. A potential for conflict index (PCI) plot of the importance of wild boar (*Sus scrofa*) management objectives attributed by each stakeholder group to enhancing or reducing an impact (red = BB, farmers' organization; blue = HVV, hunters' organization; green = NP, nature organization). The location of each PCI bubble represents the mean response of each stakeholder group. The size of the bubble represents the consensus within the stakeholder group (the larger the bubble, the smaller the consensus).

the most important wild boar management objectives, with a high level of agreement within each of the stakeholder groups (PCI_2 values between 0.061 and 0.12; Figure 2). Hunters regard none of the possible management objectives to be unimportant, while the conservationists find management objectives related to hunting or tourism gain unimportant. Among the farmers, the highest disagreements appear to exist regarding the importance of enhancing positive impacts and steering impact related to tourism (PCI_2 values between 0.31 and 0.43). Within the group of farmers, next to reducing crop damage and car collisions, reducing or preventing health risks (both for humans and livestock) were also considered to be important management objectives, and with high agreement (PCI_2 values between 0.049 and 0.076). The 4 management objectives that got the highest importance scores from the farmers also scored high among the hunters. High importance scores were attributed by the hunters to reducing or preventing the negative impacts on ecosystems, on other species, and on hunting possibilities as well as to reduce or prevent damage to public and private properties. The conservationists also attributed high importance scores to the same top 4 management objectives as the other 2 stakeholder groups. However, steering the possible positive impacts got similar importance scores as management objectives, with high agreement among the conservationists. Enhancing the positive impact of wild boar on the ecosystem was even regarded to be the most

Table 1. Pairwise comparisons of mean responses on importance of wild boar (*Sus scrofa*) objectives for each stakeholder (BB = farmers' organization, HVV = hunters' organization, NP = nature organization). Based on t-test using Bonferroni correction (51 tests, $P < 0.00098$), mean response values sharing the superscript letter a, b, or c are not significantly different between stakeholders (horizontal pairwise comparisons).

Objective/sector	BB	HVV	NP
Crop damage	1.89[a]	1.55[b]	0.68[c]
Risk for car collision	1.61[a]	1.40[a]	0.79[b]
Health risk to livestock	1.81[a]	1.27[b]	0.43[c]
Health risk to humans	1.59[a]	1.07[b]	0.39[c]
Damage to private properties	1.26[a]	1.03[a]	0.27[b]
Negative impact on other species	0.79[a,b]	1.13[a]	0.61[b]
Negative impact on ecosystem	0.72[a,b]	1.02[a]	0.62[b]
Damage to public properties	1.13[a]	0.89[a]	0.21[b]
Risk for unsafe encounter	1.24[a]	0.64[b]	0.18[c]
Positive impact on ecosystem	0.07[a]	0.74[b]	0.81[b]
Positive impact on other species	-0.04[a]	0.62[b]	0.68[b]
Positive impact on hunting	0.37[a]	1.17[b]	-0.52[c]
Tourism economic loss	0.56[a]	0.36[a]	-0.20[b]
Possibility to observe	0.19[a]	0.28[a]	0.16[a]
Availability of venison	-0.22[a]	0.91[b]	-0.34[a]
Tourism economic gain	0.17[a,b]	0.34[a]	-0.20[b]
Negative impact on hunting	0.18[a]	0.38[a]	-0.35[b]

important wild boar management objective (PCI_2 value of 0.20). Overall, opinions on the importance of the different management objectives differed significantly between stakeholders ($P < 0.05$, ges = 0.048) and between impacts ($P < 0.05$, ges = 0.114; Table 1). The importance given to an impact was found to be dependent on the stakeholder group (interaction effect $P < 0.05$, ges = 0.059).

Section 2: Legal provisions. Differences in support for the current legal provisions were found between the stakeholder groups for all but 1 provision. There was a large consensus between groups (PCI_2 values between 0.12 and 0.20; Figure 3) that a screening for possible diseases should take place by sampling wild boar that are shot. For all other legal provisions, farmers and conservationists had an opposite vision (Table 2). Conservationists gave quite uniform answers (PCI_2 values between 0.12 and 0.23), reflecting few disagreements within the group. Opinions among farmers were more divided (PCI_2 values between 0.20 and 0.33). For the hunters, both high support scores and low support scores coincided with low consensus within the group (PCI_2 values between 0.19 and 0.52). Overall, the support for current legal provisions differed significantly between stakeholders ($P < 0.05$, ges = 0.210) and between legal provisions ($P < 0.05$, ges = 0.098; Table 2). The support for legal provisions was found to be dependent on the stakeholder group (interaction effect $P < 0.05$, ges = 0.073).

Section 3: Management actions in relation to objectives. When respondents were asked to indicate the desirability of certain management actions in relation to a specific management objective, we found a significant effect of the management objective on this desirability, although its effect size was negligible ($P < 0.05$, ges = 0.009 for its individual effect on mean responses and ges < 0.002 for its interaction effects; see supplemental figure S1). Overall, opinions on the desirability of management actions differed significantly between stakeholders ($P < 0.05$, ges = 0.180) and between actions ($P < 0.05$, ges = 0.054). The desirability of an action was found to be dependent on the

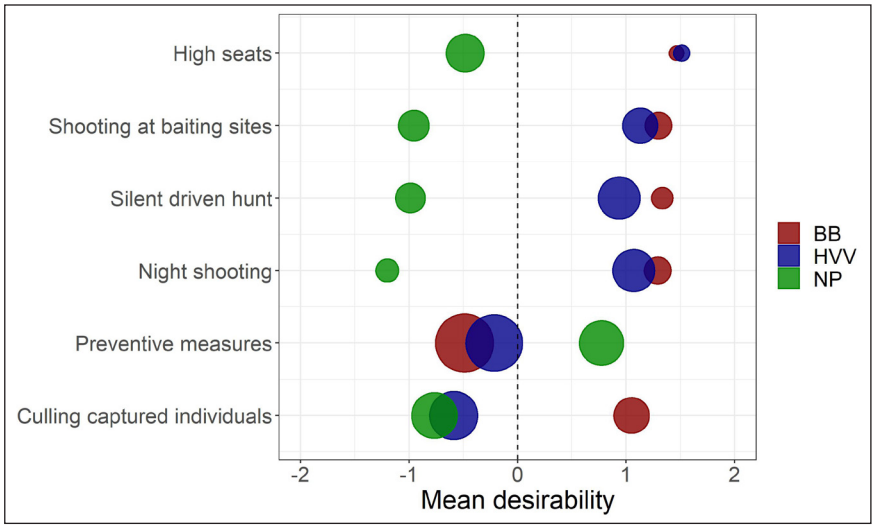

Figure 3. A potential for conflict index (PCI) plot of the support for current legal provisions by each stakeholder group (red = BB, farmers' organization; blue = HVV, hunters' organization; green = NP, nature organization). The location of each PCI bubble represents the mean response of each stakeholder group. The size of the bubble represents the consensus within the stakeholder group (the larger the bubble, the smaller the consensus).

Table 2. Pairwise comparisons of mean responses of support for the current legal provisions by each stakeholder group (BB = farmers' organization, HVV = hunters' organization, NP = nature organization). Based on t-test using Bonferroni correction (15 tests, $P < 0.0033$), mean response values sharing the superscript letter a, b, or c are not significantly different between stakeholders (horizontal pairwise comparisons).

Legal provision/sector	BB	HVV	NP
Taking samples to monitor disease	0.93[a]	0.89[a]	1.13[a]
Reporting bag record	-0.64[a]	0.64[b]	1.20[c]
Taking preventive measures is a requirement for possible damage compensation	-0.96[a]	0.26[b]	1.25[c]
Shooting plan before hunting	-0.92[a]	-0.39[b]	1.18[c]
Taking preventive measures as a requirement for night hunting	-1.05[a]	-0.57[b]	1.25[c]

stakeholder group (interaction effect $P < 0.05$, ges = 0.172). Because of the small effect size of the management objective on the desirability of a management action for a specific stakeholder group, we decided not to include different management objectives in our final PCI_2 visualization representing the desirability of management actions according to each of the stakeholder groups (Figure 4).

Applying preventive measures was the most desirable management action according to the conservationists, while this action was considered the least desirable by farmers (Figure 4; Table 3) and not desirable by hunters. However, there was a high level of disagreement found within each of latter 2 stakeholder groups (PCI_2 values 0.53 and 0.52, respectively). All lethal methods were considered to be desirable by both farmers and hunters. However, the capturing and subsequent culling of wild boar was regarded as non-desirable by the hunters. None of the lethal methods were regarded as desirable by the conservationists (Table 3).

Discussion

Due to increasing wild boar populations in the highly fragmented and densely populated region of Flanders, human–wildlife conflicts become more prominent and result in political discussion. As a consequence, the pressure rises

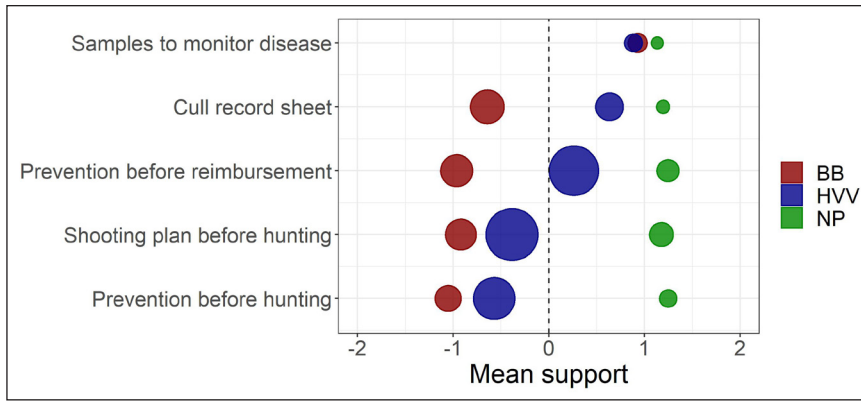

Figure 4. A potential for conflict index (PCI) plot of the desirability of different management actions according to each stakeholder group (red = BB, farmers' organization; blue = HVV, hunters' organization; green = NP, nature organization). The location of each PCI bubble represents the mean response of each stakeholder group. The size of the bubble represents the consensus within the stakeholder group (the larger the bubble, the smaller the consensus).

Table 3. Pairwise comparisons of mean responses on management actions for wild boar (*Sus scrofa*) for each stakeholder (BB = farmers' organization, HVV = hunters' organization, NP = nature organization). Based on *t*-test using Bonferroni correction (18 tests, $P < 0.0028$), mean response values sharing the superscript letter a, b, or c are not significantly different between stakeholders (horizontal pairwise comparisons).

Management action/sector	BB	HVV	NP
Culling captured individuals	1.05^{a}	-0.59^{b}	-0.77^{c}
Preventive measures	-0.49^{a}	-0.22^{b}	0.77^{c}
Night shooting	1.29^{a}	1.07^{b}	-1.20^{c}
Silent driven hunt	1.33^{a}	0.94^{b}	-0.99^{c}
Shooting at baiting sites	1.30^{a}	1.13^{b}	-0.95^{c}
High seats	1.47^{a}	1.51^{b}	-0.48^{b}

to enact effective, efficient, appropriate, and endorsed wild boar management. As for other species, differences in opinions between stakeholder groups on different aspects of wild boar management (objectives, legal provisions, and possible management actions) play an important role. Challenges lie in preventing these disagreements from developing into conflicts (Young et al. 2010; Redpath et al. 2013, 2015). The gained knowledge from this research on stakeholders' (dis)agreements will enable the Flemish authorities to establish a management strategy that is effective and supported by all involved parties, thereby preventing further escalation of social conflicts due to differences in opinions.

Our results show that although differences do exist in the importance stakeholder groups attribute to different possible management objectives, some management objectives are considered to be important by all 3 stakeholder groups. Reducing and preventing crop damage, the risk of car collisions, and health risks for both humans and livestock got high importance scores from all 3 stakeholder groups. Our results show that for wild boar management in Flanders, a group of shared management objectives can be a starting point to work in collaboration with all stakeholder groups. Identifying and agreeing over the list of objectives is a prerequisite for the selection of appropriate management actions and agreeing on the management strategy. A set of well-defined objectives form the core of all structured decision-making in environmental management, given that they define "what matters" (Gregory et al. 2012,

Runge et al. 2020). The analysis of 12 cases of urban or suburban collaborative deer management by Raik et al. (2005) revealed that the impediment for making progress was indeed not the lack of knowledge, but the fact that no agreement over management objectives was reached.

When analyzing the support for the current legal provisions related to wild boar management, differences between stakeholder groups became visible. Only the obligation to report wild boar that had been shot to a veterinarian to monitor for diseases was supported by all 3 stakeholder groups and with high internal agreement. The other legal provisions—the obligation to fill in bag reports, the requirement to take preventive measures before being able to ask for damage reimbursement, the obligation for the hunters to submit a shooting plan, and the need to take preventive measures before getting permission for shooting at night—were all supported by the conservationists. However, all 4 were declined by the farmers. The hunters supported both the legal provision that preventive measures should be taken before being able to claim damage compensations and the legal provision that hunters have to fill in a bag record for each wild boar shot, but they did not agree with the other 2 legal obligations.

Contrary to previous research (Sponarski et al. 2015, Liordos et al. 2017, Doney et al. 2018, Vaske 2018, Liordos et al. 2020), management objectives hardly influenced the desirability scores given by the member of the stakeholder group to different management actions. The members of the nature conservation organization considered taking preventive measures to be the most desirable management action in all cases. The farmers considered this action in all cases to be the least desirable. Hunters considered all forms of hunting to be in all cases more desirable than taking preventive measures in the field or capturing wild boar in cages and killing them afterward. This is in line with other studies revealing hunters to show a high acceptance for lethal methods and being in favor of all management actions involving hunting (Ericsson et al. 2004, Eklund et al. 2020, Liordos et al. 2020). As Frank et al. (2015) found, farmers supported all management actions that can reduce the number of wild boar and thereby the impact of wild boar on agricultural crops. They did not, however, support taking preventive measures, although this also reduces possible crop damage.

These results clearly reveal that the stakeholder groups that have to apply management actions do not always endorse those actions. They considered some of the possible management actions not to be desirable or considered other possible management actions to be more desirable. Moreover, stakeholder groups do not seem to support legal provisions or management actions that could have negative implications on their core activities (e.g., hunting, farming). These findings could partly explain why, although reducing and preventing crop damage is ranked by all stakeholder groups among the most important management objectives, taking preventive measures is not widely applied in Flanders. Overall, the results confirm that agreement on management objectives among stakeholder groups can coincide with disagreement regarding how to best achieve these objectives (Lute et al. 2018). Reasons for this could be differences in the believed effect of the management actions or regarding the believed ease in the use of management actions (Eklund et al. 2020). The latter can, in our case, also refer to who carries the burden of the costs of the management action. The difference in the degree management actions were known by the stakeholder groups may have affected the expressed differences in desirability. Another reason that could explain the observed differences in support for possible management actions is the differences in beliefs regarding the severity of the problems, as differences in the estimation of the current impacts of wild boar in Flanders do indeed exist at the moment (Geeraerts et al. 2019). Differences in geographic proximity (Karlsson and Sjöström 2007, Doney et al. 2018) to wild boar and its impacts are not plausible to be an explaining factor in our study, given that the survey area was restricted to those municipalities were wild boar did occur at the time of the survey.

Even if many of the management actions have already proven to be efficient in the past or abroad, they will only be effective if they are extensively implemented in the field. This will only happen when they are endorsed by those stakeholders that should implement

them. The latter is currently clearly not the case in Flanders. Active promotion of management actions that are not supported, or as is the case in Flanders, imposing them by law, may even undermine further efforts and further increase conflicts among stakeholder groups or between stakeholder groups and authorities (Frank et al. 2015, Eklund et al. 2020).

Management implications

Our study reveals that, although an agreement over the importance of management objectives is a prerequisite for sound, collaborative management among stakeholders, it does not exclude disagreement over legal provisions and management actions. Similar findings were made by Lute et al. (2018) regarding carnivore management among conservation professionals. Even though conservation professionals agreed on the main management objectives, the intrinsic values of large carnivores, the reasons to protect them, and the mean drivers for observed conflicts, they disagreed over solutions.

Understanding the reasons behind the observed disagreement over legal provisions and actions, whether believed effectiveness, differences in wildlife value orientation, or other underlying reasons (Madden and McQuinn 2014), is required to solve human–wildlife issues. Given that in Flanders the home ranges of wild boar extend over numerous private and public properties, all having different land use forms and management priorities, collaboration among all stakeholders is an indispensable necessity for successful wild boar management in the region.

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Supplementary materials

Supplementary materials can be viewed as separate file downloads at https://digitalcommons.usu.edu/hwi/vol15/iss1/15.

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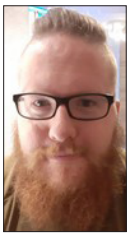

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